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$$\therefore v = \frac{x}{2\cos\theta} \sqrt{\frac{2g}{x\tan\theta - y}} \dots (1).$$

$$x = OG = OF + FG = OF + CH + HK = 26 + 14\sin\theta.$$

$$y = GD = BD - BK - KG = 72 - 14 - 14\cos\theta = 58 - 14\cos\theta.$$

$$\therefore v = \frac{(13 + 7\sin\theta)}{\cos\theta} \sqrt{\frac{g}{(13 + 7\sin\theta)\tan\theta + 7\cos\theta - 29}}.$$

When $\theta = 30^\circ$, $v = 59\sqrt{-3}$ inches, an impossible result.

$\therefore GD >$ than the intersection made by the particle on BD and indicates that the mud would never get 6 feet above the ground.

Let $\theta = 60^\circ$, $v = 273.17$ inches = 22.76 feet per second.

$t = 5280 \div 22.76 = 231.98$ seconds = 3 minutes, 51.98 seconds, time required to ride a mile.

101. Proposed by ALOIS F. KOVARIK, Instructor in Mathematics and Science, Decorah Institute, Decorah, Iowa.

Find the center of gravity of a cone that has a specific gravity of 1 (one) at the top and 2 (two) at the base.

Solution by G. B. M. ZERR, A. M., Ph. D., The Temple College, Philadelphia, Pa.; WILLIAM W. LANDIS, A. M., Dickinson College, Carlisle, Pa.; H. C. WHITAKER, Ph. D., Manual Training School, Philadelphia, Pa.

Let $y = m(x - a)$ be the equation to the generator of the cone.

$$\text{Then } \bar{x} = \frac{\int \rho y^2 x dx}{\int \rho y^2 dx} = \frac{\int_a^{2a} \rho x(x-a)^2 dx}{\int_a^{2a} \rho(x-a)^2 dx}.$$

By the conditions of the problem, $\rho = x/a$.

$$\therefore \bar{x} = \frac{\int_a^{2a} x^2(x-a)^2 dx}{\int_a^{2a} x(x-a)^2 dx} = \frac{\frac{31a^5}{30}}{\frac{7a^4}{12}} = \frac{62a}{35}.$$

$\bar{y} = 0$. $\frac{62a}{35} - a = \frac{27a}{35}$ = the distance of the center of gravity from the vertex.